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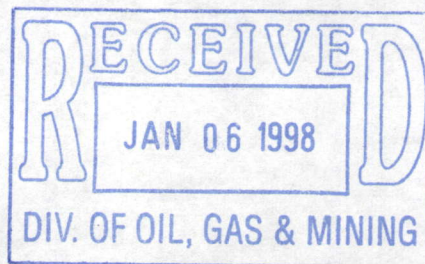
BARRICK RESOURCES (USA) INC. Tel: (801) 268-4447
Barrick Mercur Gold Mine Fax: (801) 266-4296
P.O. Box 838
Tooele, Utah 84074-0838

January 6, 1998

Mr. Don A. Ostler, PE, Director
Division of Water Quality
Utah Department of Environmental Quality
288 North 1460 West
P.O. Box 144870
Salt Lake City, UT 84116

Dear Mr. Ostler:

Re: UGW450002



Attached please find the final proposed plan for management of certain post-closure process wastewater solutions from the Reservation Canyon tailing impoundment located at the Mercur Mine. The document entitled **Post Closure Management of Reservation Canyon Tailing Impoundment Incidental Flows, Barrick Resources (USA) Inc. - Mercur Mine, January 6, 1998**, was prepared principally by Global Environmental Technologies with the assistance of Mercur engineering.

As you are aware, active gold ore mining and beneficiation ceased in March 1997. Remining and reprocessing of the historic tailing was initiated in April 1997 and will continue through March 1998. The closure plan submitted herewith identifies the processes, practices, and procedures to be utilized by Barrick to complete the post-closure management and monitoring of residual solutions associated with the Reservation Canyon tailing impoundment. Please note that while the schedules for completion of this aspect of the final closure are not exact, Barrick is proposing to complete all practicable activities in 1998.

Also please note that the plan submitted herewith compliments both the December 30, 1997, final proposed *Mining & Reclamation Plan* submitted to the Utah Division of Oil, Gas, and Mining, and the December 31, 1997, *Barrick Resources (USA) Inc. - Mercur Mine Final Tailing Impoundment Closure Plan*. Copies of these two documents have also been provided to the Division of Water Quality. Barrick anticipates that with the submittal of these documents, final approval for the closure of the Reservation Canyon tailing impoundment can be achieved by May 1, 1998.

To facilitate this goal, Barrick requests a meeting with the Division staff responsible for review and approval of this plan by the end of January 1998. Initiation of discussions at this early date will allow final details to be determined and approvals received prior to May 1, 1997, the target date for initiation of final reclamation. Barrick is committed to provide all necessary staff and resources to assist the Division in the plan approval process.

Please contact Dave Beatty at 801-268-4447x335, or me to arrange for the above noted meeting.

Respectfully;



Glenn M. Eurick
Director Environmental Relations US

C: w/ attachments:

D.P. Beatty

M.A. Wright (UDOGM)

B.W. Buck (JBR)

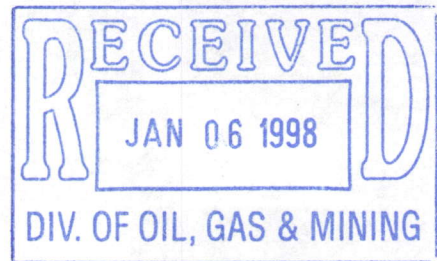
C: w/o attachments

C.L. Olsen

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D. Frederick (UDWQ)

J.S. Brown (GET)



**POST-CLOSURE MANAGEMENT
OF RESERVATION CANYON
TAILING IMPOUNDMENT
INCIDENTAL FLOWS
BARRICK RESOURCES (USA), INC.
MERCUR MINE**

January 5, 1998

Prepared by:
GLOBAL ENVIRONMENTAL TECHNOLOGIES, LLC
Salt Lake City, UT



GLOBAL ENVIRONMENTAL TECHNOLOGIES L.L.C.

3630 EAST CASCADE WAY S.L.C. UTAH 84109 801-463-0902 801-463-0504 FAX

January 5, 1998

Mr. Glenn Eurick
Barrick Resources (USA), Inc.
8 East Broadway
Suite 613
Salt Lake City, UT 84111

**RE: Transmittal of Post-Closure Management of Reservation Canyon Tailing
Impoundment Incidental Flows, Barrick Resources (USA), Inc. Mercur
Mine**

Dear Glenn:

Please find enclosed 6 copies of the final Post-Closure Management of Incidental Flows, Barrick Resources (USA), Inc. Mercur Mine. This document presents information on the volume and quality of small flows emanating from 4 locations surrounding the tailing impoundment, and a plan for their long-term management. We have provided you with the additional copies necessary for your distribution to the Utah Division of Water Quality, Utah Division of Oil, Gas, and Mining, and the Mercur Mine.

We appreciate the opportunity to work with you on this project. Please contact me if you have any questions regarding this transmittal.

Very truly yours,
Global Environmental Technologies, L.L.C.

John S. Brown, P.G.
Manager

Enclosure: 6 Reports

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1.0 INTRODUCTION

Barrick Mercur Mine is undergoing closure. Barrick is currently performing reclamation activities including closure and reclamation of valley fill leach areas, recontouring and reclamation of mining disturbances, and closure of the mill and tailing impoundment. Several small surface flows (incidental flows) are associated with the tailing impoundment and will require management both during the closure phase, and long-term. This document addresses a proposal for the long-term management strategy for the incidental flows. The proposal to manage all tailing impoundment area incidental flows represents best management practices through the utilization of engineered facilities, monitoring, and scientific modeling and characterizations. As these flows are a minor component of the overall lined tailing basin infiltration balance, incidental flow management as proposed will not increase the likelihood or potential for degradation of the ground water resource of the State of Utah, which has been, and will continue to be demonstrated through routine monitoring of wells immediately adjacent to and downgradient of the tailing impoundment.

All aspects of this proposal are currently covered by either UGW450002 or the VFL2 Stipulation and Consent Order Docket No. GW90-03-A. Expanded State authority could be accomplished through incorporation of the VFL2 Order into UGW450002. Barrick intends to resolve the issues for management of the incidental flows prior to June 1998 so that an engineered design can be implemented as part of the overall Mercur Mine Comprehensive Closure Plan.

1.1 General

Barrick Resources (USA), Inc. – Mercur Mine (Barrick) is preparing final closure plans for the Reservation Canyon Tailing Impoundment. Closure and reclamation of the facility will be performed in a phased approach. This approach is described in the Mercur Mine Final Tailing Impoundment Closure Plan developed by JBR Consultants Group, December, 1997. Long-term closure issues addressed in this document include management of incidental flows from the structures surrounding the tailing impoundment.

Incidental flows include two sites that originate from locations at the main tailing dam, and two flows from beneath the saddle dam located in the Manning Canyon drainage. Specifically, these flows are identified as those from: 1) the levee seepage collection system; 2) the saddle seep collection system; 3) the main dam seepage collection cistern (pumpback), and; 4) the main dam chimney drain collection at the toe of the main dam. All flows originate from infiltrating tailing waters within the impoundment. Incidental flows that daylight at these locations are small in comparison with the overall tailing impoundment water balance and hydrological considerations permitted under Utah Groundwater Quality Discharge Permit UGW450002. Presently, no water quality impacts are identified in monitoring wells located downgradient of the tailing impoundment and all wells remain in full compliance with established performance levels.

Feasibility of both active and passive treatment and disposal options of residual mine waters have been evaluated for Barrick by other consultants. Active disposal methods would require large capital and energy costs, significant maintenance, considerable manpower, and are not well suited to the deminimus volumes projected for these incidental flows. In addition, passively or actively treated water would require surface or underground discharge not necessarily representing an overall environmental advantage to the approach proposed herein.

Previous evaluations included a report of evaporation methods prepared by JBR (1995), and a report of mine water active treatment alternatives performed by SRK (1995). Additional treatment options were investigated by TriTechnics (1996) including a passive treatment disposal option (anaerobic bio-pass). The study resulted in a pilot test of a bioreactor cell using flow from the main chimney drain of the tailing impoundment. Passive options proved infeasible for the environmental conditions present at the Mercur site and the water chemistry treated by the pilot test. Results of the pilot test indicated little success in a reduction of some chemical constituents in the discharged water.

2.0 FACILITY DESCRIPTION

The Reservation Canyon Tailing Impoundment has been in operation since the spring of 1983. The tailing impoundment area is approximately 118 acres at the 7355-foot elevation. Presently, the tailing impoundment contains about 85 million gallons of free (reclaim) water and 24 million tons of deposited, consolidated ore beneficiation tailing. Approximately 31 acres of tailing are covered as a result of the upstream construction on the main tailing dam, the reclaim levee and the reclaim cell, and beneath the east bay impoundment. Tailing is currently saturated near the surface level at the 7340-foot elevation. The east bay facility was constructed during 1995 and 1996 to accommodate up to 72 million gallons of clear reclaim solution. The east bay facility is a synthetically-lined facility designed to store reclaim water and accommodate the forced evaporation efforts. The majority of reclaim water is currently impounded in the east bay. This component of the overall Reservation Canyon Tailing Impoundment is an integral part of the water management and disposal during the closure of the impoundment.

Current corporate directives require Mercur to complete covering of the tailing between 1998 and 1999. During this closure phase, reclaim water will be directed to the northwest corner of the tailing impoundment for subsequent transfer to the east bay. Residual waters from the pumpdown of Valley Fill Leach Area #3 will also be managed in the east bay.

3.0 INCIDENTAL FLOW MANAGEMENT PROCEDURES

The projected timing for management of incidental flows is dependent on the elimination of the freestanding water currently deposited in the tailing impoundment, and timing of the reclamation. During cover placement, water will be managed in the east bay for forced evaporation.

A HELP model was performed (TriTechnics, 1996) to evaluate cover options and draindown timing for the tailing. Draindown time was used in the 1996 evaluation to predict the estimated time that incidental seepage flows will continue into the future. Results of the modeling show that the tailing mass could potentially free drain in about 10 or 11 years. The upper 90 feet or more of the tailing mass could drain in about 7 to 9 years. This time could be significantly longer if the formations beneath the facility do not allow free draining to occur. Physical Resource Engineering (PRE, 1996) also performed an evaluation of draindown times for the tailing impoundment. Results of this evaluation indicated similar results and draindown times. As the tailing mass drains, the expected volume of the incidental flows is expected to diminish because the majority of the incidental flow volumes originate from locations near the tailing surface.

Long-term management of the incidental flows will occur in two phases. The initial phase is currently being implemented whereby incidental flows are pumped to the northwest corner of the impoundment basin. Eventually, these incidental waters will be pumped to the east bay storage area from the main tailing dam pumpback system, while flow rates will be monitored to size the final infiltration design for phase 2. Incidental water will also be pumped from the other main dam source, the levee seepage collection system to the northwest corner of the impoundment or the east bay when significant volumes are present.

Following completion of tailing cover placement and decommissioning of all piping and pumping equipment, incidental seepage collection waters can no longer be received at the east bay. Electrical power will no longer be available for active pumping from the

pumpback on the main tailing dam. It is at this time that the second phase of incidental water management will be initiated.

The second phase will include direct vadose zone infiltration of incidental flows at two locations, shown on Figure 1. The first location will infiltrate waters through an engineered infiltration gallery sited near the base of the main dam. This location will include flows collected from the main tailing dam pumpback system and from the main dam chimney drain. The second location will include collection of flows from the saddle seep and from the levee seepage collection system on the Manning Canyon drainage. The second location will combine the two flows in a header collection pipe, then route the combined flows through a buried pipe into Valley Fill Leach Area 2 (VFL2). VFL2 is in closure status and currently under a negotiated Stipulation and Consent Order Docket No. GW90-03-A with the UDWQ.

4.0 INCIDENTAL FLOW QUALITY AND QUANTITY

The estimated quantity of water from incidental flows is based on flow rates measured by Barrick, and estimates of seepage based on visual observations. Water quality was evaluated from routinely sampled seepage collection systems in order to assess the anticipated quality of waters remaining at the time of closure. Water quality is summarized in Table 1. This table summarizes data from: 1) the levee seepage collection system; 2) saddle seep collection system; 3) the main dam seepage collection cistern (pumpback), and; 4) the main dam chimney drain collection at the toe of the main dam. Water quality estimates are based on total values for metals, where applicable.

4.1 Main Dam Infiltration Gallery Sources

The main dam infiltration gallery will collect incidental flows from two locations. These locations include the main dam seepage collection system and the main dam chimney drain. Infiltration during the post-closure period at this location is not expected to exceed an estimated long-term range of 15 to 25 gpm.

4.1.1 Main Dam Seepage Collection

The main dam seepage collection system collects the largest of all of the incidental flows that permeate the upstream dike construction portion of the tailing impoundment above the 7250-foot elevation. The collected seepage is currently pumped back to the northwest corner of the tailing impoundment. Water from the main dam seepage collection cistern has characteristics consistent with the reclaim water in the main impoundment basin. The main dam seepage collection averages about 17 gallons per minute (gpm). Figure 2 presents the main dam seepage collection cistern flows since January 1994. Minimum flows have been at zero, and peak flows have been as much as 35 gpm. Changes in the flow rates are observed to be dependent on location changes of tailing slurry drop in the impoundment. Based on the drain-down time predicted for the tailing (TriTechnics, 1996), this source is expected to diminish with time.

Discharge from this system and could substantially be reduced in 8 to 11 years following closure. During the initial phase of closure and tailing draindown, this flow will be managed in the east bay.

4.1.2 Main Dam Chimney Drain

Incidental flows from the main dam chimney drain are summarized in Table 1. Flow rates from the chimney drain average 0.34 gpm, but have been measured as high as 1 gpm, and are currently collected in a lined pond at the base of the main dam for evaporation and pumped back to the tailing impoundment. Flow rates with time are shown on Figure 3. Flow from the chimney drain is estimated to continue indefinitely, because meteoric precipitation will continue to recharge the tailing following closure. The main dam chimney drain solution contains constituents consistent with the tailing reclaim solution. Flows from the main dam chimney drain will be collected during the initial impoundment closure phase in the lined pond at the base of the main dam.

4.2 Manning Canyon Collection Sources

Tailing impoundment incidental flows in the Manning Canyon drainage will be collected and disposed of within VFL2. VFL2 is the preferred location for infiltration of these flows because the majority of the canyon is underlain by impermeable Manning Canyon Shale, the characteristics of the seepage are consistent with the quality of water in VFL2, and the VFL2 facility is monitored with a ground water quality monitoring well. Characteristics of these flows are consistent with reclaim water. Flows in this drainage include the saddle dam chimney drain, the saddle seep flow resulting from a lack of saddle dam foundation integrity, and flows from the levee seepage collection system. It should be noted that no significant volumes of tailing lie behind the saddle dam proper. Flows from these locations are small, and are projected to range between 1 and 5 gpm.

4.2.1 Levee Seepage Collection

The levee seepage collection system (elevation 7217ft) collects seepage through the levee buttress south of the main tailing impoundment. The levee buttress isolates the reclaim cell/saddle dam from the tailing impoundment basin proper. The levee buttress is contained within the reclaim cell. Barrick has developed a collection system on a concrete apron structure that returns water collected from or along the levee buttress back to the east bay. Flows in the levee seepage collection system are not presently metered. Flows are estimated to be in the 25 to 30 gpm range during active tailing deposition near the levee buttress (Dick Gili, 1996, verbal communication). Currently the flow in this area is several gpm or less. Barrick has observed that the flow rate to the apron within the reclaim cell diminishes rapidly when tailings are deposited at locations away from the reclaim cell.

Water quality data for the levee seepage collection system are summarized in Table 1. Mean water quality concentrations are consistent with reclaim water characteristics. Seepage to the levee seepage collection system is expected to diminish with time, as the tailing drain.

4.2.2 Saddle Seep

Water collected in the saddle seep collection system in Manning Canyon below the saddle dam (southern and eastern edge of tailing impoundment basin) is sampled and measured by Barrick on a regular basis. Water quality data from this collection system are summarized in Table 1. Seepage water is presently captured and contained within a lined holding pond at elevation of about 7135 ft. The chimney drain for the saddle dam is also routed to this collection system but does not currently report water. The saddle seep collection system has characteristics similar to the levee seepage collection system; however it shows lower concentrations of many constituents.

The flow rate from the saddle seep collection system is shown with time on Figure 4. The average flow rate is about 0.11 gpm. No clear trend of flow is evident with time, although the flow rate peaked during July 1995 at 0.57 gpm. Freezing conditions may also effect the flow rate from this source. Considering the drain-down time predicted for the tailing mass in the tailing cover HELP model (TriTechnics, 1996), this source volume is expected to diminish with time.

5.0 POST-CLOSURE INFILTRATION

Post-closure infiltration of the incidental flows is small compared with estimates of liner seepage from the tailing impoundment. Estimates of tailing impoundment seepage have been calculated in previous reports submitted to the UDWQ (Dames & Moore, 1991) that indicated a range of seepage between about 120 to 160 gpm. Seepage estimates were calculated using Darcy's Law and were based on hydraulic conductivity measurements made for the liner, beach and tailing materials. Monitor wells located immediately downgradient of the impoundment indicate no impacts to ground water from the tailing basin seepage.

Infiltration of incidental flows will not increase net infiltration to ground water, because these flows originate from the impoundment, and will be infiltrated within the same hydrologic regime. Total volumes of the incidental flows are not expected to exceed a range of between 20 and 30 gpm and are reasonably projected to decrease significantly during the effective periods of the ground water quality discharge permit UGW450002 as a result of engineered cover performance.

Based on prior discussions with the UDWQ during a closure meeting on June 4, 1997, it is possible that management of the incidental flows could be secured through an infiltration gallery configuration located immediately adjacent to the impoundment. However, the UDWQ requested additional information on the system, incidental flow volumes and water quality before making this determination. It is probable that this discharge can be accommodated through modification of groundwater quality discharge permit UGW450002 at the tailing impoundment.

5.1 Infiltration Gallery Design Below Main Dam

An infiltration gallery will be designed to handle flows near the base of the main dam. Prior to siting the infiltration gallery, topsoil stockpiles currently located in the canyon bottom area will be removed and the site regraded. The infiltration gallery will be sized

based on site-specific geotechnical data collected from the proposed site, and from the results of flow measurements made during the previous phase of incidental flow management. All components of the installation will be subgrade and below the 18-inch frostline depth.

Limited hydraulic conductivity data has been obtained from the proposed infiltration area. Permeability tests were performed in alluvium resting on shales in Reservation Canyon (Dames & Moore, 1982), resulting in a range of permeability from $6.7\text{e-}7$ cm/sec to $9.0\text{e-}3$ cm/sec. Permeability estimates were also made in bedrock (Woodward-Clyde Consultants, 1981) immediately below the site of the main dam. Borehole 25 was packer tested between the depth of 20.4 to 192.1 feet in the unsaturated Upper Great Blue Limestone. Results ranged from $1.1\text{e-}4$ cm/sec to $7.8\text{e-}5$ cm/sec in the limestone sections tested. Although this data is helpful in feasibility evaluations for infiltration and preliminary sizing of the design, additional data will be required for sizing the final design.

Data requirements to size the infiltration gallery include:

- Review of additional soil and bedrock permeabilities and geotechnical data collected during the initial siting of the tailing impoundment and main tailing dam;
- Digging test pits and soil logging using the Unified Soil Classification System (ASTM D 2488-90);
- Collection of bulk soil samples for laboratory grain size analysis and distribution (ASTM D422);
- Collection of a series of 2 to 5 hand-driven soil samples for falling head permeability testing (EM 1110-2-1902);
- Performance of a series (2 to 4) double ring infiltrometer tests (ASTM D 3385-88) to adequately characterize the infiltration rates of the soils.

Results of the field investigation and laboratory testing will be used in conjunction with previously acquired data to size the infiltration gallery for the projected flow rate.

The collection system on the main dam will be designed to incorporate existing engineered features that include the concrete collection apron and collection cistern at elevation 7250 feet. A geotextile-wrapped gravel and french drain collection pipe system will be designed and installed to collect water from the concrete apron and will divert the flow to the existing cistern. The collection system will be designed such that the entire system will be covered to a minimum depth of 18 inches, and seeded.

The collection cistern will route the collected flow through subgrade piping via gravity flow to the base of the main dam where the pressure heads will be equalized. Piping will connect with a header pipe that also receives flow from the main dam chimney drain. The header pipe (approximate elevation 7000 feet) will evenly distribute and discharge the combined flow through a series of subgrade corrugated high-density polyethylene piping enveloped by clean-washed 1 to 1.5-inch gravel wrapped in geofabric. The entire infiltration area will be covered and seeded.

5.2 Infiltration in Manning Canyon

Infiltration of incidental flows in Manning Canyon is more difficult to accomplish because low permeability shale and argillite underlie the canyon. Therefore, the most feasible option is to convey collection of the saddle seep and the reclaim levee collection to VFL2. Total flow from both locations is expected to be in the 1 to 5 gpm range.

VFL2 is a 21-acre facility previously used for cyanide leaching of low-grade gold ores. Residual water quality in the facility is comparable with incidental water quality from both locations. The facility is presently covered with subsoil and topsoil and has been successfully revegetated. To date VFL2 has shown no water quality impacts in an approved monitor well located adjacent to this facility.

Infiltration to VFL2 will be completed through a subgrade collection system, similar to that being designed for the main dam, using many of the existing engineered features. A gravel burrito (clean-washed gravel enveloped within geofabric) will be constructed on

the concrete apron of the levee seepage collection system (7217 feet), with discharge from the burrito routed to a collection cistern. Water will be conveyed in subgrade piping directly into VFL2 above the liner at an approximate elevation of 7090 feet. Flows from the saddle seep will be collected and tied into the piping system at an approximate elevation of 7120 feet. Piping can accommodate flow metering. Injection into VFL2 will be accomplished through a drilled horizontal perforated pipe that will be advanced through the engineered cover. As a result of the expected low flow volume and the high permeability and storage capacity of the subore in VFL2, management of incidental flows within VFL2 is expected to have little to no impact on the facility or to ground water.

To facilitate this approach, Barrick will initiate discussions with the UDWQ in January 1998 to allow incorporation of the terms and conditions of the existing Consent Order into UGW450002. This approach would provide the State an additional level of post-closure compliance monitoring under the ground water quality discharge permit due to the anticipated expiration of the Consent Order conditions in the year 2000.

6.0 REFERENCES

Dames & Moore, February 1982, Seepage and Contaminant Control Evaluation, Reservation Canyon Tailings Disposal Area, Mercur Gold Project, Mercur Utah for Getty Mineral Resources Company.

Dames & Moore, 1991, Reservation Canyon Tailings Impoundment Hydrogeologic Investigation for Ground Water Discharge Permit, Mercur Gold Mine for Barrick Resources (USA), Inc. Volume I.

Dick Gili, 1996, March 28, 1996 verbal communication regarding flow rates from the levee seepage collection system.

JBR Consultants Group, 1995, Study of Solar Evaporative Methods for the Tailings Impoundment for Barrick Resources (USA), Inc.

SRK, 1995, Barrick Mercur Mine Water Treatment Alternatives, (SRK#12402), September 1995.

TriTechnics, 1996, Passive Treatment and Disposal Options, Reservation Canyon Tailing Impoundment, residual Waters and Seepage Collection System, Barrick Mercur Mine for Barrick Resources (USA), Inc.

TriTechnics, 1996, Infiltration Analysis, Reservation Canyon Tailing Impoundment Barrick Mercur Mine, prepared for Barrick Resources (USA), Inc.

Woodward-Clyde Consultants, 1981, Basic Geotechnical Data Report, Reservation Canyon Dam Site, Mercur Gold Project, Tooele County, Utah.

TABLE 1
STATISTICAL SUMMARY OF INCIDENTAL FLOW WATER QUALITY FROM TAILING IMPOUNDMENT

Sample Location	Statistic	Alkalinity (mg/l) (Total)	Ammonia (mg/l) (Nitrogen)	Arsenic, T (mg/l)	Bicarbonate (mg/l) (As HCO ₃)	Cadmium, T (mg/l)	Calcium (mg/l)
Levee Seepage Collection System	Min	71	8.69	0.062	87	<0.001	102
Levee Seepage Collection System	Max	387	35.60	0.360	471	0.003	520
Levee Seepage Collection System	Mean	127	17.77	0.238	154	0.001	414
Number of Analyses Evaluated		8	8	8	8	8	8
Ave. Flow Rate (gpm) ⁻¹	5						
Saddle Seep Collection System	Min	149	0.20	<0.005	182	<0.001	276
Saddle Seep Collection System	Max	304	4.86	0.049	371	0.005	640
Saddle Seep Collection System	Mean	215	1.49	0.015	262	0.002	490
Number of Analyses Evaluated		13	9	13	13	13	13
Ave. Flow Rate (gpm) ⁻²	0.11						
Main Dam Seepage Collection Cistern	Min	80	10.50	0.221	98	<0.001	417
Main Dam Seepage Collection Cistern	Max	102	18.90	0.470	125	<0.001	532
Main Dam Seepage Collection Cistern	Mean	89	14.02	0.324	109	<0.001	463
Number of Analyses Evaluated		10	10	10	10	10	10
Ave. Flow Rate (gpm) ⁻²	17.2						
Main Dam Chimney Drain	Min	63	0.24	0.564	77	<0.001	199
Main Dam Chimney Drain	Max	414	22.90	2.320	504	<0.001	598
Main Dam Chimney Drain	Mean	219	13.82	1.171	265	<0.001	473
Number of Analyses Evaluated		17	15	16	17	17	17
Ave. Flow Rate (gpm) ⁻²	0.34						

-1 Estimated from pumping

-2 Estimated from monthly flow rate data

If values are less than detection, then 1/2 of detection limit was used in evaluation

TABLE 1
STATISTICAL SUMMARY OF INCIDENTAL FLOW WATER QUALITY FROM TAILING IMPOUNDMENT

Sample Location	Statistic	Chloride (mg/l)	Conductivity (umhos/cm)	Copper, T (mg/l)	Cyanide-Free (mg/l)	Cyanide-Total (mg/l)	Fluoride (mg/l)
Levee Seepage Collection System	Min	196	3860	<0.01	0.008	0.174	0.98
Levee Seepage Collection System	Max	311	4700	0.130	1.080	9.520	2.31
Levee Seepage Collection System	Mean	216	4380	0.070	0.479	1.410	1.24
Number of Analyses Evaluated		8	8	8	7	8	8
Ave. Flow Rate (gpm) ⁻¹	5						
Saddle Seep Collection System	Min	453	3340	0.010	0.012	0.004	0.24
Saddle Seep Collection System	Max	600	4030	0.162	1.500	2.530	1.16
Saddle Seep Collection System	Mean	531	3826	0.062	0.187	0.250	0.60
Number of Analyses Evaluated		13	13	13	9	13	13
Ave. Flow Rate (gpm) ⁻²	0.11						
Main Dam Seepage Collection Cistern	Min	174	3840	<0.001	0.009	0.129	1.37
Main Dam Seepage Collection Cistern	Max	499	5570	<0.001	0.104	0.465	1.70
Main Dam Seepage Collection Cistern	Mean	225	4497	<0.001	0.053	0.256	1.52
Number of Analyses Evaluated		10	10	10	8	10	10
Ave. Flow Rate (gpm) ⁻²	17.2						
Main Dam Chimney Drain	Min	287	580	<0.01	0.002	0.055	0.65
Main Dam Chimney Drain	Max	957	6830	0.548	8.220	11.880	2.72
Main Dam Chimney Drain	Mean	659	5034	0.203	0.934	1.838	1.25
Number of Analyses Evaluated		17	17	17	15	15	14
Ave. Flow Rate (gpm) ⁻²	0.34						

-1 Estimated from pumping

-2 Estimated from monthly flow rate data

If values are less than detection, then 1/2 of detection limit was used in evaluation

TABLE 1
STATISTICAL SUMMARY OF INCIDENTAL FLOW WATER QUALITY FROM TAILING IMPOUNDMENT

Sample Location	Statistic	Hardness, (mg/l) (Calculated)	Iron, T (mg/l)	Lead, T (mg/l)	Magnesium, T (mg/l)	Manganese, T (mg/l)	Mercury, T (mg/l)
Levee Seepage Collection System	Min	1288	0.03	<0.005	24	0.38	<0.0002
Levee Seepage Collection System	Max	1426	1.40	<0.005	214	0.85	0.0019
Levee Seepage Collection System	Mean	1341	0.44	<0.005	52	0.59	0.0009
Number of Analyses Evaluated		5	8	8	8	8	8
Ave. Flow Rate (gpm) ⁻¹	5						
Saddle Seep Collection System	Min	1287	0.03	<0.005	64	0.79	<0.0005
Saddle Seep Collection System	Max	1287	3.38	<0.005	183	1.77	0.0260
Saddle Seep Collection System	Mean	1287	0.66	<0.005	87	1.22	0.0027
Number of Analyses Evaluated		1	13	13	13	13	13
Ave. Flow Rate (gpm) ⁻²	0.11						
Main Dam Seepage Collection Cistern	Min	1150	0.09	<0.005	26	0.32	0.0006
Main Dam Seepage Collection Cistern	Max	1600	2.45	0.015	66	0.49	0.0023
Main Dam Seepage Collection Cistern	Mean	1289	0.46	<0.005	32	0.41	0.0012
Number of Analyses Evaluated		10	10	10	10	10	10
Ave. Flow Rate (gpm) ⁻²	17.2						
Main Dam Chimney Drain	Min	1501	0.17	<0.005	22	0.30	<0.0002
Main Dam Chimney Drain	Max	1545	1.59	0.049	110	5.06	0.0202
Main Dam Chimney Drain	Mean	1523	0.55	0.007	82	3.04	0.0022
Number of Analyses Evaluated		2	17	17	17	17	17
Ave. Flow Rate (gpm) ⁻²	0.34						

-1 Estimated from pumping

-2 Estimated from monthly flow rate data

If values are less than detection, then 1/2 of detection limit was used in evaluation

TABLE 1
STATISTICAL SUMMARY OF INCIDENTAL FLOW WATER QUALITY FROM TAILING IMPOUNDMENT

Sample Location	Statistic	Nitrate (mg/l) (Nitrogen)	Nitrite (mg/l) (Nitrogen)	pH	Phosphorous, T (mg/l)	Selenium, T (mg/l)	Sodium (mg/l)	Sulfate (mg/l)	TDS (mg/l)
Levee Seepage Collection System	Min	7.16	1.280	7.65	0.02	<0.002	430	767	3328
Levee Seepage Collection System	Max	29.80	9.980	8.13	0.41	0.217	738	2502	4064
Levee Seepage Collection System	Mean	16.21	5.814	7.84	0.10	0.140	563	2045	3731
Number of Analyses Evaluated		8	8	8	8	8	8	8	8
Ave. Flow Rate (gpm) ⁻¹	5								
Saddle Seep Collection System	Min	3.32	0.006	7.52	0.01	<0.002	270	742	2830
Saddle Seep Collection System	Max	41.20	2.780	8.01	1.14	0.085	504	1523	3530
Saddle Seep Collection System	Mean	21.01	0.863	7.82	0.19	0.016	335	1231	3141
Number of Analyses Evaluated		13	13	13	13	13	13	13	13
Ave. Flow Rate (gpm) ⁻²	0.11								
Main Dam Seepage Collection Cistern	Min	9.23	4.750	7.71	0.09	0.170	482	1900	3290
Main Dam Seepage Collection Cistern	Max	25.85	8.850	7.95	0.25	0.291	762	2380	4070
Main Dam Seepage Collection Cistern	Mean	19.01	7.089	7.85	0.16	0.235	589	2198	3648
Number of Analyses Evaluated		10	10	10	10	10	10	10	10
Ave. Flow Rate (gpm) ⁻²	17.2								
Main Dam Chimney Drain	Min	0.21	0.006	6.98	0.06	<0.002	402	973	2410
Main Dam Chimney Drain	Max	41.00	7.650	8.29	1.78	0.195	894	2690	5610
Main Dam Chimney Drain	Mean	10.67	1.463	7.57	0.54	0.044	702	1998	4283
Number of Analyses Evaluated		17	17	17	17	17	17	17	17
Ave. Flow Rate (gpm) ⁻²	0.34								

-1 Estimated from pumping

-2 Estimated from monthly flow rate data

If values are less than detection, then 1/2 of detection limit was used in evaluation

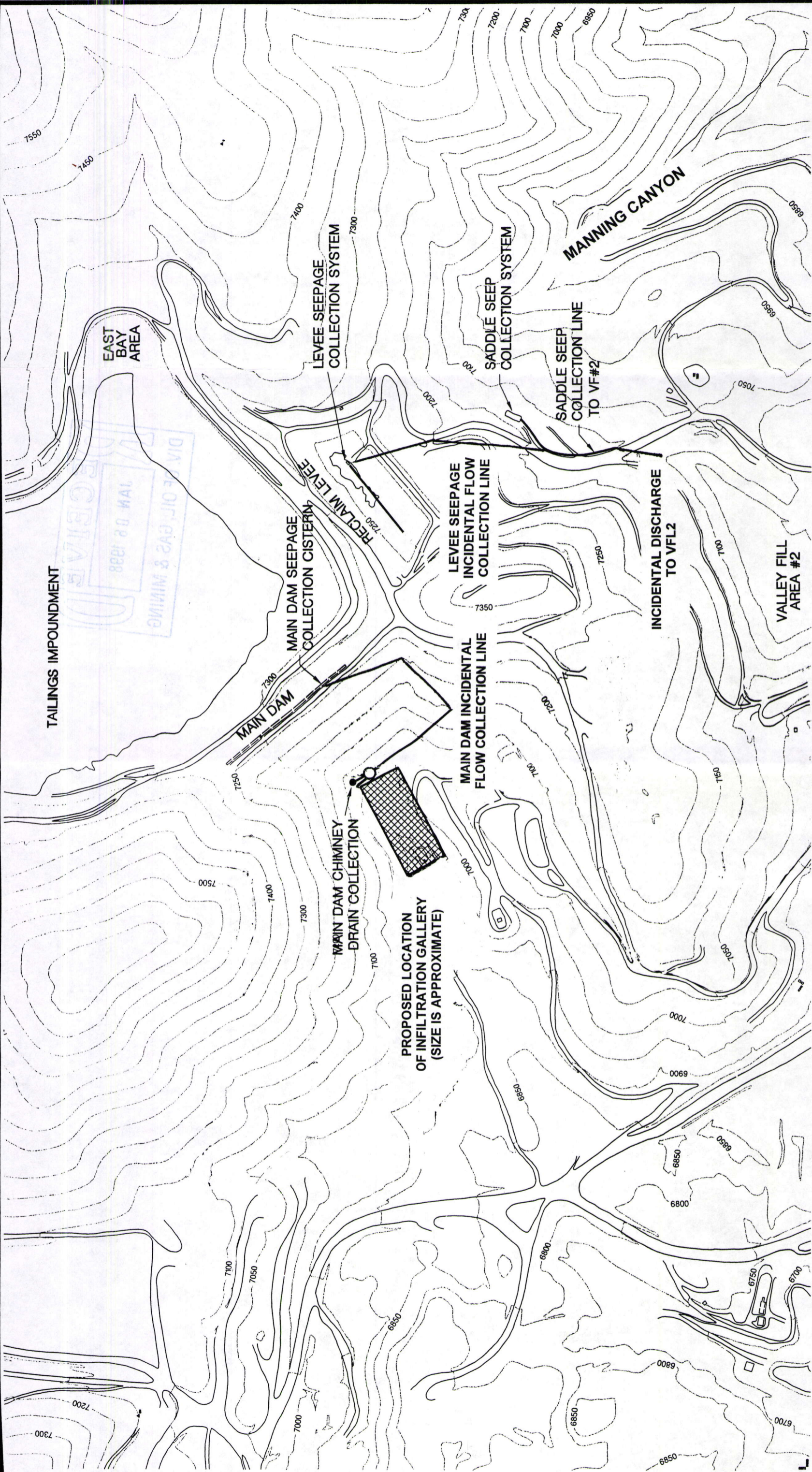
TABLE 1
STATISTICAL SUMMARY OF INCIDENTAL FLOW WATER QUALITY FROM TAILING IMPOUNDMENT

Sample Location	Statistic	Thallium, T (mg/l)
Levee Seepage Collection System	Min	0.380
Levee Seepage Collection System	Max	0.671
Levee Seepage Collection System	Mean	0.484
Number of Analyses Evaluated		8
Ave. Flow Rate (gpm) ⁻¹	5	
Saddle Seep Collection System	Min	<0.01
Saddle Seep Collection System	Max	0.004
Saddle Seep Collection System	Mean	0.010
Number of Analyses Evaluated		13
Ave. Flow Rate (gpm) ⁻²	0.11	
Main Dam Seepage Collection Cistern	Min	0.076
Main Dam Seepage Collection Cistern	Max	0.160
Main Dam Seepage Collection Cistern	Mean	0.121
Number of Analyses Evaluated		10
Ave. Flow Rate (gpm) ⁻²	17.2	
Main Dam Chimney Drain	Min	0.001
Main Dam Chimney Drain	Max	0.064
Main Dam Chimney Drain	Mean	0.025
Number of Analyses Evaluated		17
Ave. Flow Rate (gpm) ⁻²	0.34	

-1 Estimated from pumping

-2 Estimated from monthly flow rate data

If values are less than detection, then 1/2 of detection limit was used in evaluation



NOTE: TOPOGRAPHIC MAP OF THE BARRICK MERCUR MINE PROVIDED BY BARRICK. TOPOGRAPHY UPDATED 9/93 AND DOES NOT REFLECT MOST RECENT CHANGES.

PROPOSED LOCATIONS FOR INFILTRATION SYSTEMS

Barrick Mercur Mine
Mercur, UT

RECEIVED
JAN 06 1998
DIV. OF OIL, GAS & MINING

MAIN DAM SEEPAGE COLLECTION CISTERN

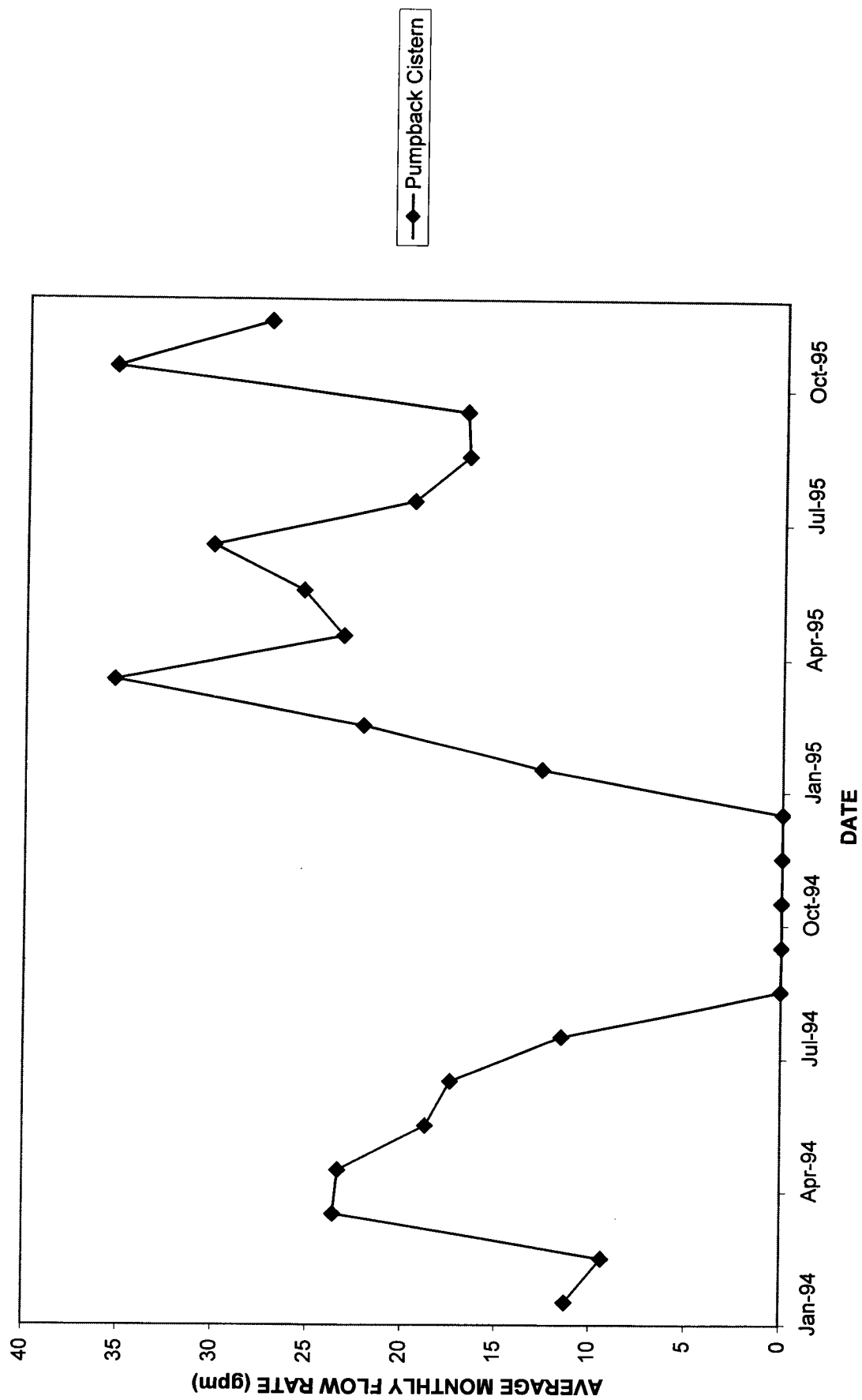


FIGURE 2

MAIN DAM CHIMNEY DRAIN COLLECTION

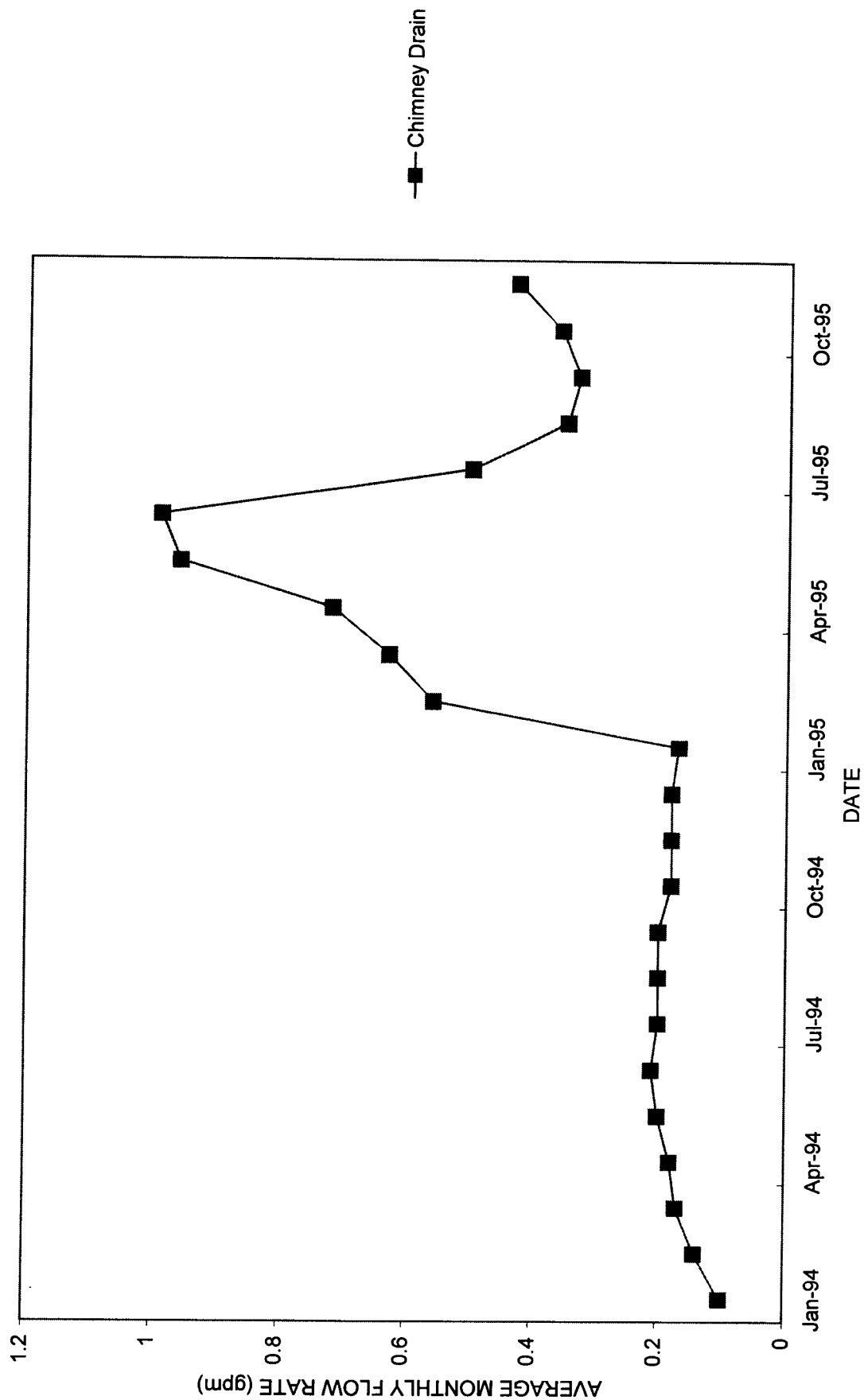


FIGURE 3

SADDLE SEEP COLLECTION SYSTEM

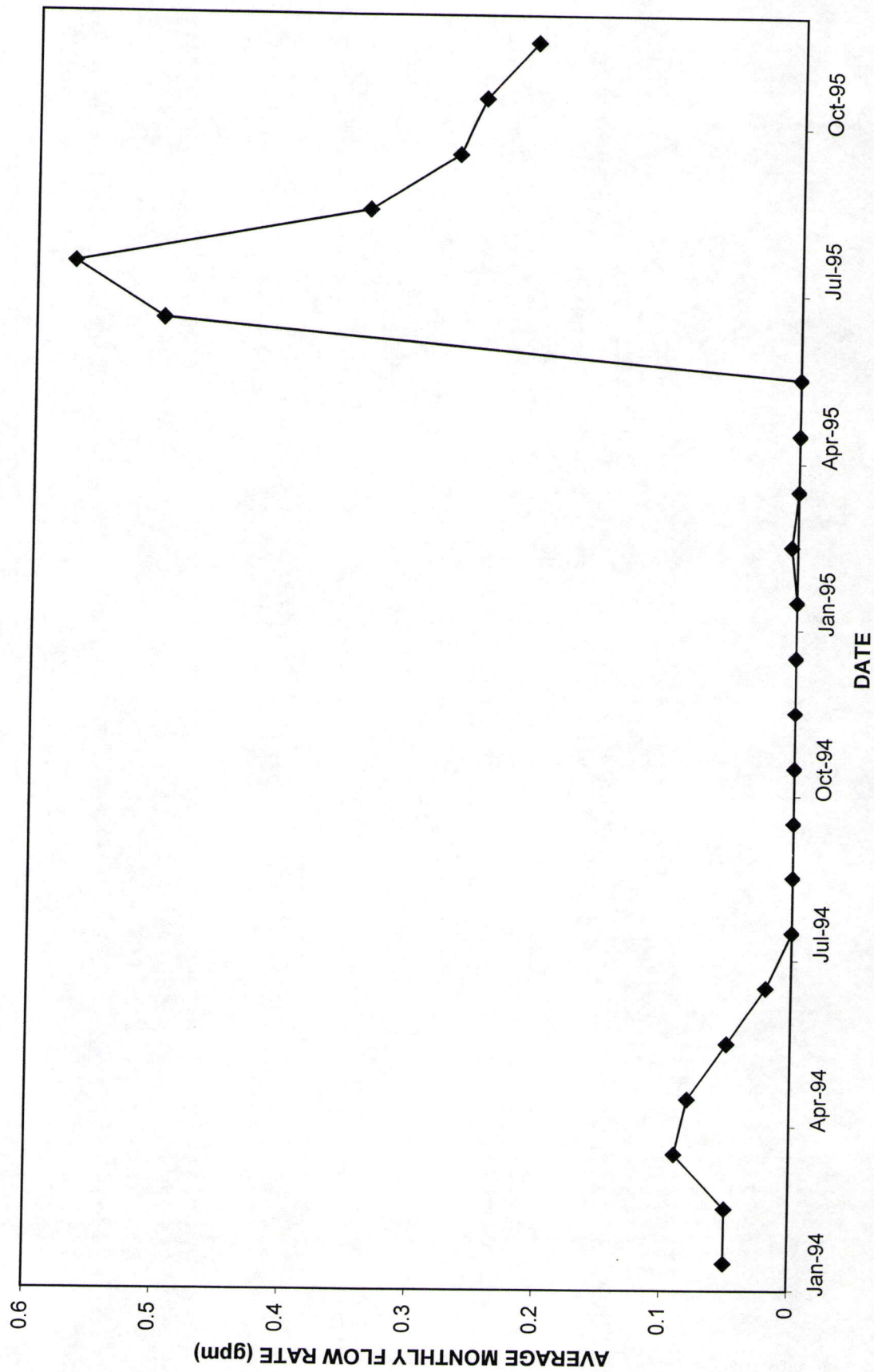


FIGURE 4